


# EXHIBIT A

16422

	<b>Disclosure FIS8-2002-0306</b>
	Prepared for and/or by an IBM Attorney - IBM Confidential
	Created By Sadanand V Deshpande
	Last Modified By Judy Paolillo

Required fields are marked with the asterisk (\*) and must be filled in to complete the form.

**\*Title of disclosure (in English)**

STI stress modification by Nitrogen plasma treatment for improving performance in small (RX) width devices.

**Summary**

Status	Final Decision	(File)
Final Deadline		
Final Deadline Reason		
Docket Family	FIS9-2003-0078	
*Processing Location	Fishkill	
*Functional Area	select	(KBG) KBG ... CHEN; CMOS-6X/HPLS
Attorney/Patent Professional		Joseph P Abate/Fishkill/IBM
IDT Team	select	Oleg Gluschenkov/Fishkill/IBM William Devine/Fishkill/IBM DOMINIC SCHEPIS/Fishkill/IBM David Hanson/Fishkill/IBM Thomas Dyer/Fishkill/IBM Noah Zamdmer/Fishkill/IBM DURESETI CHIDAMBARRAO/Fishkill/IBM Werner Rausch/Fishkill/IBM Samuel Fung/Fishkill/IBM
Submitted Date		
*Owning Division	select	MD
Incentive Program		
Lab		
*Technology Code		101N2
PVT Score		

**Inventors with a Blue Pages entry**

Inventors: Sadanand V Deshpande/Fishkill/IBM, Bruce Doris/Fishkill/IBM, Werner Rausch/Fishkill/IBM, James Slinkman/Burlington/IBM

Inventor Name	Inventor Serial	Div/Dept	Inventor Phone	Manager Name
Deshpande, Sadanand V		29/BIXA	532-9157	
Doris, Bruce B.		29/BIXA	532-3681	
Rausch, Werner		29/GMYA	532-2129	
Slinkman, J.A. (James)		29/B5TV	446-1681	



## **Main Idea for Disclosure FIS8-2002-0306**

Prepared for and/or by an IBM Attorney - IBM Confidential

Archived On

### **Title of disclosure (in English)**

STI stress modification by Nitrogen plasma treatment for improving performance in small (RX) width devices.

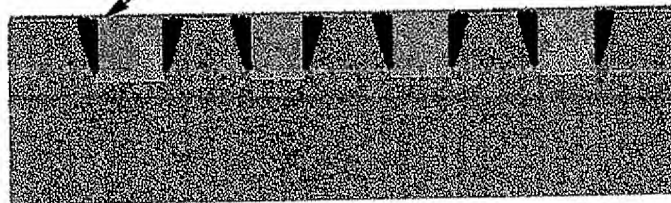
### **Main Idea of disclosure**

1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.

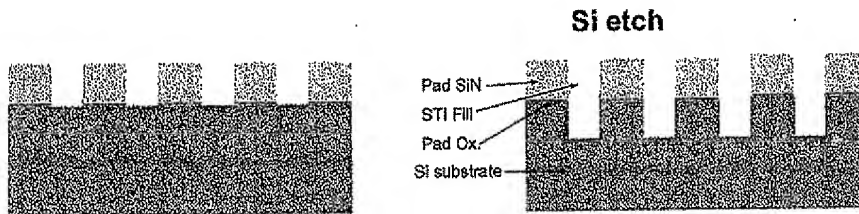
**Use of DPN (nitrogen plasma treatment) or RPN (remote plasma nitridation) to treat the shallow trench region to modulate stress in small Rx devices.**

In a standard process flow, oxidation from gate oxides and gate reoxidation can create compression in the active areas leading to degradation for NFETs and improvement for PFETs. Recently we have observed up to 17% Ion degradation at a fixed Ioff for NFET and up to 17 % improvement in PFET in small Rx devices. This invention overcomes the degradation and also provides a method to retain the enhancement for the PFET. The birds beaking is shown below:

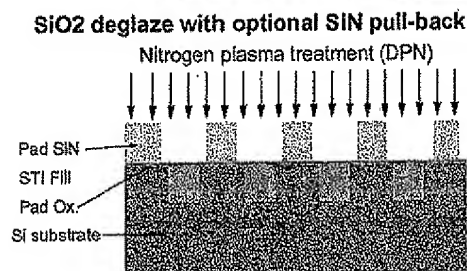
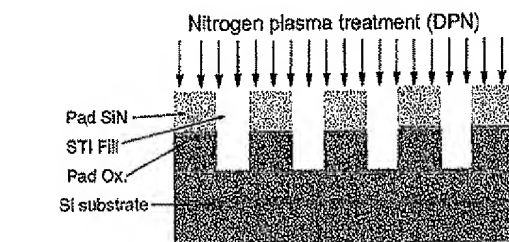
Birds' beak caused by oxidation



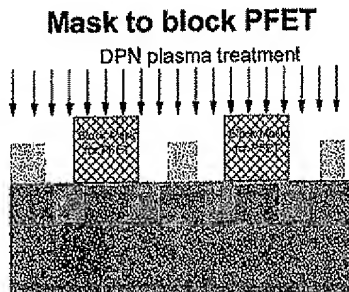
**Standard shallow trench isolation formation (hard-mask process).**



The STI corners can be treated with Plasma nitridation using a source such as a DPN tool at various steps in the process to reduce the bird's beak formation.



In a preferred embodiment, a mask may be used to block the PFET while allowing the NFET active area, STI corners to receive the plasma treatment. Blocking the PFET during the nitridation process enables the longitudinal direction to be under compressive strain thereby enhancing the PFET mobility. The fact that this invention reduces the bird's beak effect reduces the compression which can degrade NFET mobility by a significant amount.



2. How does the invention solve the problem or achieve an advantage, (a description of "the invention", including figures inline as appropriate)?

Main idea for disclosure - continued

3. If the same advantage or problem has been identified by others (inside/outside IBM), how have those others solved it and does your solution differ and why is it better?

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.